METHOD OF MAKING TEXTURED EDGING

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to molded barrier edging for lawns and gardens and to a method of making the molded barrier edging.

2. Description of Related Art

[0002] Barrier edging devices are barrier structures that are placed in the ground surrounding lawns and gardens to inhibit vegetative growth and separate various sections of a lawn or garden from one another. Barrier edging devices may also be placed around trees and other landscaping to prevent dirt from eroding or encroaching upon the bordered landscaping. Depending on the particular application, the barrier edging may also include various decorative features.

[0003] Typically, a piece of barrier edging is a single-piece molded plastic structure having a serrated penetrating edge for penetrating the ground, a decorative or utility portion which extends above the ground when the barrier edging is in place, and pin and receptacle portions at respective ends of the barrier edging. The pin and receptacle portions at respective ends of the piece of barrier edging allow a piece of barrier edging to be connected with other pieces of barrier edging to form long, contiguous stretches of barrier edging. Most pin and receptacle arrangements allow pieces of barrier edging to be connected to one another with an angle between two pieces of barrier edging, e.g., 90°, so that the barrier edging can be used to form shapes. Some types of barrier edging allow individual pieces of barrier edging to be connected with one another using a hinged connection so that the user can set substantially any angle between two pieces of barrier edging.

[0004] An example of the hinged type of barrier edging is disclosed in U.S. Patent No. 5,775,027 to Tisbo et al. The barrier edging of Tisbo et al. includes an above-ground decorative portion as well as a beveled, serrated edge for penetrating the ground. A receptacle is molded into one end of the barrier edging, and a corresponding flange is molded into the other end of the barrier edging. In this reference, the receptacle is cylindrical in shape and substantially hollow, while the flange is correspondingly cylindrical and is designed to fit within the hollow portion of

the receptacle, forming a hinged connection so that two attached pieces of barrier edging can be swiveled to establish substantially any angle between them.

[0005] Non-hinged barrier edging that uses hollow rectangular receptacles is also available. This type of barrier edging is not hinged and usually restricts the angle at which a connection can be made between two pieces of barrier edging to either 90° or 180°.

[0006] Both types of barrier edging described above, hinged and non-hinged, are conventionally produced by injection molding a plastic material into a suitable mold. As is known in the art, an injection molding process requires two complimentary die portions having internal surfaces that define the features of the product to be molded. Conventionally, to make the edging, the two molding dies that comprise the mold are moved relative to one another in a vertical direction with respect to the faces of the barrier edging. This conventional process makes it simple to mold the receptacle portion of the edging because all that is needed is a vertical projection in the mold about which the receptacle portion is formed.

[0007] However, using the process described above, it is difficult to make barrier edging having an intricate three-dimensional configuration. One example of barrier edging with such an intricate three-dimensional configuration is barrier edging having a textured front face that resembles natural wood grain. The difficulties arise because the vertical direction in which the molding dies are moved relative to the faces of the barrier edging will damage or mar the three-dimensional configuration. For example, with a textured front face, the vertical movement of the dies will wipe away the texture if the dies are pulled apart vertically. Therefore, in order to make barrier edging with a decorative texture, the molding dies are typically pulled apart horizontally, i.e., in a direction perpendicular to the front and back faces of the barrier edging.

[0008] One conventional option to make a textured barrier edging is to move the molding dies horizontally and use metal inserts in the mold to create the receptacle structure. Unfortunately, this option increases tooling costs and slows down the molding cycle time because the insert must be removed and replaced for each and every injection.

SUMMARY OF THE INVENTION

[0009] One aspect of the present invention provides a molded barrier edging comprising a single thin wall structure of a readily moldable material. The thin wall structure has a first and and a second end spaced generally horizontally from the first end when the molded barrier edging is in an operative position.

[0010] The thin wall structure includes a lower penetrating portion constructed and arranged to be moved generally vertically in penetrating relation into a ground area so that the lower penetrating portion is fixed within the ground area when the molded barrier edging is in the operative position. The thin wall structure also includes an upper barrier portion constructed and arranged to be disposed above the ground area when the lower penetrating portion is fixed therein. The lower penetrating portion and upper barrier portion define front and back faces of the thin wall structure. The front face of the upper barrier portion is configured to provide a decorative, viewable appearance.

[0011] The thin wall structure also includes first and second complimentary thin wall connecting elements integrally formed at the first and second ends, respectively. The first and second complimentary thin wall connecting elements are positioned such that the first connecting element complimentarily connects with a second connecting element of a first similar barrier edging fixed within the ground area by moving the penetrating portion of the molded barrier edging generally vertically into the ground area in adjacent relation to the first similar barrier edging. Thus, the molded barrier edging extends from the first similar barrier edging generally perpendicularly therefrom, generally in alignment therewith, or at any angular relation therebetween.

[0012] When the penetrating portion of the molded barrier edging is fixed within the ground area, the second connecting element of the molded barrier edging complimentarily connects with a first connecting element of a second similar barrier edging by moving the penetrating portion of the second similar barrier edging vertically into the ground area so as to extend generally perpendicularly therefrom, generally in alignment therewith, or at any angular relation therebetween.

[0013] The thin wall structure including the first and second complimentary connecting elements of the molded barrier edging are molded integrally between a single pair of

complimentary molding dies relatively moveable toward and away from one another in opposite relative directions generally perpendicular to the front and back faces of the molded barrier edging.

[0014] Another aspect of the present invention provides a method of molding a barrier edging. The method comprises providing a pair of complimentary molding dies relatively moveable toward and away from one another in opposite relative directions. According to the method, each die has surfaces constructed and arranged to define a piece of barrier edging as described above. The method further comprises engaging the pair of complimentary dies by moving them in a closing direction toward one another and generally perpendicular to the molding surfaces such that the surfaces are directly opposed to one another and the molding surfaces are in cooperating relation to one another so as to define a void space between them.

[0015] The method next comprises injecting a molding material into the void space. Following the injection, the method comprises allowing the injected molding material to set, thereby forming the molded barrier edging. Finally, the method comprises removing the molded barrier edging from the complimentary dies after effecting a relative movement of the complimentary dies in an opening direction away from one another and generally perpendicular to the molding surfaces.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] Various exemplary embodiments will be described with reference to the following drawings, in which like reference characters represent like features, wherein:

[0017] Figure 1 is a front perspective view of a piece of molded barrier edging according to an embodiment of the present invention;

[0018] Figure 2 is a back perspective view of the piece of molded barrier edging illustrated in Figure 1;

[0019] Figure 3 is a detail-perspective view of the molded barrier edging of Figures 1 and 2, illustrating a receptacle structure according to an embodiment of the present invention;

[0020] Figure 4 is a partial front elevational view of two pieces of molded barrier edging according to the present invention, illustrating a connection therebetween;

[0021] Figure 5 is a plan view of the two pieces of connected molded barrier edging illustrated in Figure 4, illustrating several of the plurality of angles that may be established between the two pieces;

[0022] Figure 6 is a front perspective view illustrating several pieces of molded barrier edging in a stacked configuration;

[0023] Figure 7 is an exploded perspective view of a piece of molded barrier edging and two dies used in molding the piece of barrier edging, according to the present invention;

[0024] Figure 8 is a sectional view through line 10-10 of Figure 2, illustrating a portion of the two dies of Figure 7 engaged to form the connecting receptacle member without a molding material injected therein;

[0025] Figure 9 is a sectional view similar to that of Figure 8, illustrating a portion of the two dies of Figure 7 engaged to form the connecting receptacle member with a molding material injected therein;

[0026] Figure 10 is an exploded sectional view through line 10-10 of Figure 2, illustrating a portion of the two die of Figure 7 and the resulting connecting receptacle member of a piece of barrier edging according to the present invention; and

[0027] Figure 11 is a high-level block diagram of a method of molding barrier edging according to the present invention.

DETAILED DESCRIPTION

[0028] Referring now more particularly to the Figures, Figure 1 thereof is a front persepective view of a piece of molded barrier edging, generally indicated at 10, according to an embodiment of the present invention. The molded barrier edging 10 is a single, thin wall structure of a readily-moldable material having a first end 12 and a second end 14.

[0029] According to an embodiment of the invention, the readily-moldable material that forms molded barrier edging 10 is a plastic material such as polyethylene, polypropylene, polystyrene, poly(vinyl chloride) or poly(methyl methacrylate). The readily-moldable material typically includes other components in addition to the base polymer, for example, plasticizers, fillers, pigments and dies, photoinhibitors and viscosity additives. Other suitable plastics (and optional additives) are known to those skilled in the art, and may be selected as the readily-moldable material of molded barrier edging 10. According to another embodiment, molded barrier edging may be comprised of metals, metal alloys or glass-based materials, if such materials are desired for durability or decorative reasons.

[0030] As illustrated in Figure 1, molded barrier edging 10 has a lower penetrating portion, generally indicated at 16, and an upper barrier portion, generally indicated at 18. Lower penetrating portion 16 is of a nominal thickness and has a beveled, serrated edge 20 extending substantially the entirety of its length. The actual thickness of lower penetrating portion 16 and beveled, serrated edge 20 will vary with the other dimensions of barrier edging 10, but should be thin enough to penetrate the ground with only a moderate amount of force applied by the user to effect such penetration.

[0031] In the embodiment illustrated in Figure 1, the serrations of beveled, serrated edge 20 extend to the border between upper barrier portion 18 and lower penetrating portion 16. However, it is contemplated that the serrations of beveled, serrated edge 20 may be of substantially any height in relation to lower penetrating portion 16 and upper barrier portion 18.

[0032] Also illustrated in Figure 1 is upper barrier portion 18 of barrier edging 10. Upper barrier portion 18 is constructed and arranged to be disposed above the ground when lower penetrating portion 16 has been inserted into the ground. Upper barrier portion 18 and lower penetrating portion 16 define front 22 and back 24 faces of barrier edging 10. Only front face 22 of barrier edging 10 is shown in Figure 1.

[0033] As shown, front face 22 is configured to provide a decorative, viewable appearance. In the embodiment illustrated in Figure 1, front face 22 is comprised of a number of shaped sections 26. Shaped sections 26 are arranged in a regular pattern which extends the length of barrier edging 10. In the illustrated embodiment, there are four shaped sections 26, each of the four shaped sections 26 having a different width. The different widths of shaped

sections 26 provide barrier edging 10 with a more "natural" (i.e., less manufactured) look. There may be any number of shaped sections 26 in a piece of barrier edging 26. Shaped sections 26 may also be provided with a molded texture, although these features are not illustrated in Figure 1. As will be explained below, if shaped sections 26 are provided with a molded texture, the advantageous features of the present invention would prevent that texture from "smearing" during the molding process. Each of the shaped sections 26 includes a top edge 28 that extends perpendicular to the height of barrier edging 10. If shaped sections 26 are provided with a decorative texture, then top edge 28 may also be provided with that molded texture to provide continuity in appearance between shaped sections 26 and top edge 28.

[0034] In the embodiment illustrated in Figure 1, shaped sections 26 of upper barrier portion 18 are aligned with the serrations of beveled, serrated edge 20 such that the widths of the serrations of beveled, serrated edge 20 generally conform to the widths of the individual shaped sections 26. A different type of alignment between the upper barrier 18 and lower penetrating 16 portions may be selected. In particular, the characteristics and alignment of the lower penetrating portion 16 may be adapted to suit penetration of different types of ground cover, ranging from soft mulch to hard soils.

[0035] Figure 2 is a rear perspective view of barrier edging 10. As shown, back face 24 of barrier edging 10 has a series of strengthening ribs 30 positioned at regular intervals along its length. Strengthening ribs 30 extend from top edge 28 to the bottom of each serration of beveled, serrated edge 20. A horizontal strengthening rib may optionally extend from the first end 12 to the second end 14 of barrier edging 10, forming the border between upper barrier portion 18 and lower penetrating portion 16 – however, this is not necessary and thus is not depicted in the illustrated embodiment. A thicker series of section ribs 34 separate the various shaped sections 26 of upper barrier portion 18. Small reinforcing ribs 36 extend from an upper part of back face 24 to top edge 28, thus reinforcing top edge 28.

[0036] Barrier edging 10 is constructed and adapted to be connected to other similar pieces of barrier edging 10 to form a connected series of barrier edging 10, and thus enclose a large ground area. To facilitate such a connection between adjacent pieces of barrier edging 10, barrier edging 10 includes two complimentary, thin-wall connecting structures, a protruding pin structure 38 integrally molded with the first end 12, and a corresponding receptacle structure 40 integrally molded with the second end 14 of barrier edging 10.

[0037] Figure 3 is a detail-perspective view of the receptacle structure 40. As shown in Figures 1-3, the receptacle structure 40 is a semi-cylindrical structure having a series of adjacent wall sections 42 that comprise its walls. Each of the wall sections 42 has a cylindrical interior surface, and alternating ones of the wall sections 42 are open to the exterior in alternating directions. The position and size of wall sections 42 allow receptacle structure 40 to be molded by horizontally-moving molding dies without the use of a separate mold insert, as will be described below in greater detail. In the embodiment of Figure 3, the exterior surfaces of wall sections 42 are also cylindrical in shape, although any shape may be selected for the exterior surfaces of wall sections 42.

[0038] The protruding pin structure 38 of an adjacent piece of barrier edging 10 is designed to fit within the receptacle structure 40 to form a connection between the two pieces of barrier edging. Figure 4 is a partial front elevational view of two pieces of barrier edging 10, illustrating the connection between the two. As shown, protruding pin structure 38 is seated in receptacle structure 40. A portion of protruding pin structure 38 is visible through an open wall section 42 of receptacle structure 40; the remainder of protruding pin structure 38 is depicted in phantom.

[0039] The complimentary connection between protruding pin structure 38 and receptacle structure 40 is established by inserting protruding pin structure 38 into receptacle structure 40 by a vertical movement of one piece of barrier edging 10 relative to the other. This connection may be made either before or after the two pieces are inserted into the ground. The connection between the two pieces of barrier edging 10 is such that they may be rotated relative to one another so as to establish substantially any angle therebetween. Because there are a plurality of wall sections 42 comprising receptacle structure 40, the connection between protruding pin structure 38 and receptacle structure 40 is both transversely and translationally stable in nature. In other words, because protruding pin structure 38 contacts all of the multiple wall sections 42, the connection between the protruding pin structure 38 and receptacle structure 40 is resistant to torsional stresses and angular displacements as well as tensile stresses and axial displacements.

[0040] In the embodiment illustrated in the Figures, protruding pin structure 38 has a "plus" cross-sectional shape, rather than a circular cross-sectional shape. This shape of

protruding pin structure 38 is advantageous in that it requires less of the readily-moldable material to create, thus saving weight and money. It will be realized that protruding pin structure 38 may have any cross-sectional shape, so long as the cross-sectional shape of protruding pin structure 38 is capable of being rotated freely within receptacle structure 40 once the two structures 38, 40 are engaged.

[0041] Figure 5 is a plan view of two connected pieces of barrier edging 10, illustrating a few of the various angles that may be established between the two pieces of barrier edging 10. Angles of 180° (straight), ±90° and ±45° are shown in Figure 5, although substantially any angle is possible. This large range of possible angles allows a connected series of barrier edging 10 to be arranged in a polygonal shape, a spline, or any other segmented shape or pattern, including a semi-circular or circular pattern. Therefore, barrier edging 10 may be used to surround an entire garden or plot of land, encircle the base of a tree, or provide a border between a landscaped area at the foot of a building and other land. Other possible uses will occur to those skilled in the art.

[0042] In general, the hinged, complimentary connections between pieces of barrier edging 10 are established such that each piece of barrier edging 10 extends straight, without significant bends along its length. This allows complex shapes to be formed by the connected series of barrier edging 10 without subjecting any one piece of barrier edging 10 to significant bending stresses. Such bending stresses may reduce the useful life of a piece of barrier edging 10.

[0043] Figure 6 is a front perspective view of several pieces of barrier edging 10 in a stacked configuration. This stacked configuration of barrier edging 10 may be used advantageously for packaging and shipping purposes. The degree to which pieces of barrier edging 10 may be stacked depends, among other factors, on the depth and characteristics of the strengthening ribs 30, 34, 36 that are provided on back face 24 of barrier edging 10. It is contemplated that each piece of barrier edging 10 may be of the same length, in which case a set of pieces of barrier edging 10 could be sold together to form a connected series of a defined length. For example, each piece of barrier edging 10 could be manufactured so as to have a length of eighteen inches, and a set of eight pieces barrier edging 10 could then be packaged and sold together so as to define a connected series length of twelve feet.

[0044] Figure 7 is an exploded perspective view of a piece of barrier edging 10 and two complimentary molding dies 44, 46 that are used in a method of molding barrier edging 10. The two complimentary molding dies 44, 46 are moveable toward and away from one another in a single plane. Each molding die 44, 46 has molding surfaces constructed and arranged to form the features of barrier edging 10. Only the molding surfaces 48 of molding die 46 are shown in Figure 7. Note that no separate insert is used with molding dies 44, 46 to create receptacle structure 40.

[0045] Figures 8, 9, and 10 are sectional views of a portion of molding dies 44, 46 and barrier edging 10 through line 10-10 of Figure 2, illustrating the manner in which receptacle structure 40 is formed.

[0046] Figure 8 illustrates the two dies 44, 46 engaged without any molding material injected therein. As shown, the molding surface 48 of one of the molding dies 46 has a protruding core portion 50. The protruding core portion 50 inserts into a complimentary depression 52 provided in the molding surface 54 of the other molding die 44. The insertion of protruding core portion 50 into complimentary depression 52 leaves void space 56 that will be filled by the readily-moldable material, forming wall sections 42 of receptacle structure 40. The location of protruding core portion 50 also prevents readily-moldable material from flowing into the portions of receptacle structure 40 that are to become open wall sections 42.

[0047] In other words, wall sections 42 of receptacle structure 40 allow a cylindrical to be formed by mold projections that are perpendicular to that of the faces 48, 54 of the two molding dies 44, 46, rather than parallel to them. Such an arrangement does not require the use of a separate insert that is actuated in relation to the two molding dies 44, 46 by a cam or other mechanical system. Therefore, a piece of barrier edging 10 having a wood grain appearance or other intricate, decorative molded pattern on the upper barrier portion 18 can be molded without the use of an insert and without the intricate, molded texture "smearing" or deforming as a result of the movement of molding dies 44, 46.

[0048] Figure 9 is a view substantially similar to that of Figure 8, illustrating material injected into the previously empty void spaces 56. The sections of material illustrated at 58 are front wall sections 42 of receptacle structure 40; the section of material illustrated at 60 is a rear

wall section 42 of receptacle structure 40. The released piece of barrier edging 10 and molding dies 44, 46 are illustrated in the sectional view of Figure 10.

[0049] Figure 11 is a high-level flow diagram of a method 100 of molding a piece of barrier edging 10 according to the present invention. Method 100 begins and proceeds to block 102 in which the appropriate molding dies 44, 46 are provided, along with the other necessary molding equipment. The user then performs the task of block 104, in which the two molding dies 44, 46 are moved into engagement by effecting a relative movement of the two molding dies 44, 46 in a direction perpendicular to the faces 48, 54 of the two molding dies 44, 46. After block 104, the user performs the task of block 106, in which an appropriate molding material is injected into the mold through an appropriate opening provided in the mold. Once the molding material is injected in block 106, it is allowed to cool and set in block 108, thus forming a piece of barrier edging 10. Finally, in block 110, the molding dies 44, 46 are moved out of engagement by effecting a relative motion between the two in a direction perpendicular to the front and back faces 22, 24 of the barrier edging 10, and the barrier edging 10 is released. Following block 110, method 100 ends. Various other tasks may be necessary in method 100, or in a method similar to method 100, depending on the type of equipment used to perform method 100, the molding material used, and the volume of production.

[0050] While the invention has been described by way of example embodiments, it is understood that the words which have been used herein are words of description, rather than words of limitation. Changes may be made within the purview of the appended claims without departing from the scope and spirit of the invention in its broader aspects. Although the invention has been described herein with reference to particular structures and embodiments, it is understood that the invention is not limited to the particulars disclosed. The invention extends to all appropriate equivalent structures, uses and mechanisms.